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SECTION 07220

ROOF INSULATION

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A208.1 (1993) Particleboard

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 208 (1995) Cellulosic Fiber Insulating Board

ASTM C 578 (1995) Rigid, Cellular Polystyrene Thermal Insulation

ASTM C 726 (1993) Mineral Fiber Roof Insulation Board

ASTM C 728 (1997) Perlite Thermal Insulation Board

ASTM C 1050 (1991) Rigid Cellular
Polystyrene-Cellulosic Fiber Composite
Roof Insulation

ASTM C 1289 (1995) Faced Rigid Cellular
Polyisocyanurate Thermal Insulation Board

FACTORY MUTUAL ENGINEERING AND RESEARCH (FM)

FM P9513 (1996) Loss Prevention Data for Roofing
Contractors

FM P7825a (1998) Approval Guide Fire Protection

FM P7825c (1998) Approval Guide Building Materials

UNDERWRITERS LABORATORIES (UL)

UL Bld Mat Dir (1998) Building Materials Directory

1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL

PROCEDURES:

SD-06 Instructions

Application of Insulation; FIO.

Insulation manufacturer's recommendations for the application and installation of insulation.

SD-08 Statements

Inspection; FIO.

The inspection procedure for insulation installation, prior to start of roof insulation work.

SD-13 Certificates

Insulation; FIO.

Certificate attesting that the expanded perlite or polyisocyanurate insulation contains recovered material and showing estimated percent of recovered material. Certificates from roofing membrane manufacturer certifying the roof insulation is acceptable for use with their roofing membrane system.

1.3 STORAGE OF MATERIALS

Extruded polystyrene shall be stored in accordance with manufacturer's instructions. Other insulation, base sheet, and felt shall be kept dry at all times, before, during, and after delivery to the site and shall be stored in an enclosed building or in a closed trailer. Wet insulation, wet base sheet or wet felt shall be permanently removed from the site. Felts shall be stacked on end one level high. Felt rolls shall be maintained at a temperature above 10 degrees C for 24 hours immediately before laying.

1.4 FIRE CLASSIFICATION

Insulation shall have been tested as part of a roof construction assembly of the type used in this project and the construction shall be listed as Fire-Classified in UL Bld Mat Dir or Class I in FM P7825a.

PART 2 PRODUCTS

2.1 INSULATION

Insulation shall be a standard product of the manufacturer and shall be factory marked with the manufacturer's name or trade mark, the material specification number, the R-value at 24 degrees C, and the thickness. Minimum thickness shall be as recommended by the manufacturer. Boards shall be marked individually. The thermal resistance of insulation shall be not less than the R-value shown on the drawings. The insulation manufacturing process shall not include chlorofluoro carbons (CFC) or formaldehydes. Insulation and fiberboard shall contain the highest practicable percentage of material which has been recovered or diverted from solid waste (e.g., postconsumer waste), but not including material reused in a manufacturing process. Where two materials have comparable price and performance, the one having the higher recovered material content shall be selected. Insulation shall be acceptable for direct application

on metal deck. Insulation for elastomeric roofing (EPDM) shall be tapered polystyrene with factory laminated perlite or fiberboard overlay. Insulation for modified bitumen roofing shall be one, or a combination of the following materials, except polystyrene:

2.1.1 Composite Board Insulation

ASTM C 726, or ASTM C 1050 or ASTM C 1289 Type III, or ASTM C 1289 Type VI. Perlite, in composite board, may be replaced with ANSI A208.1 wood particle board, 11 mm (7/16 inch) minimum thickness, provided that the composite board meets specified physical requirements. Composite board with wood particle board shall conform to ASTM C 1289, Type V.

2.1.2 Expanded-Perlite Insulation Board

ASTM C 728 with a minimum recovered material content of 23 percent of the expanded perlite portion of the board.

2.1.3 Fiberboard

ASTM C 208 Type II, Grade 1 or 2, roof insulating board with a minimum recovered material content of 80 percent, treated with sizing, wax or bituminous impregnation. Bituminous impregnation shall be limited to 4 percent by weight when used over steel decks.

2.1.4 Polyisocyanurate

ASTM C 1289, Type I, or ASTM C 1289 Type II, having minimum recovered material content of 9 percent by weight of the polyisocyanurate portion of the board.

2.1.5 Molded Polystyrene

ASTM C 578, Type II, VIII or IX.

2.2 NAILS AND FASTENERS

2.2.1 Fasteners

Insulation manufacturer's recommendations except holding power, when driven, shall be not less than 178 N each in steel deck. Fasteners for steel or concrete decks shall conform to FM P7825c for Class I roof deck construction, and shall be spaced to withstand an uplift pressure of 4.3 kPa.

2.2.2 Metal Disks

Flat and not less than 0.39 mm thickness. Disks used with nails or fasteners for securing fiberboard insulation shall be minimum 25 mm diameter. Disks used with nails or fasteners for securing other board insulation shall be minimum 53 mm in diameter.

2.3 WOOD NAILERS

Wood nailers shall conform to Section 06100 ROUGH CARPENTRY, including preservative treatment. Edge nailers shall be not less than nominal 150 mm wide and of thickness to finish flush with the top surface of the insulation. Surface mounted nailers shall be a nominal 75 mm wide by the full thickness of the insulation.

PART 3 EXECUTION

3.1 COORDINATION REQUIREMENTS

Insulation and roofing membrane shall be finished in one operation up to the line of termination at the end of each day's work. Completed sections shall be waterproofed when more than one day is required to finish the roofing. Phased construction will not be permitted.

3.2 ENVIRONMENTAL CONDITIONS

Air temperature shall be above 4 Degrees C and there shall be no visible ice, frost, or moisture on the roof deck when the insulation and roofing are installed.

3.3 SUBSTRATE PREPARATION

The substrate construction of any bay or section of the building shall be completed before insulation or vapor retarder work is begun thereon. Vents and other items penetrating the roof shall be secured in position and properly prepared for flashing. Substrate surface shall be smooth, clean, and dry at time of application.

3.4 INSTALLATION OF WOOD NAILERS

Nailers shall be secured to steel decks as indicated. Bolt anchors shall have nuts and washers countersunk, and bolts shall be cut flush with top of nailer. Powder-actuated fasteners, sized and spaced for nailer anchorage equivalent to that specified and indicated, may be used when approved. Surface mounted nailers shall be installed parallel with the roof slope and shall be spaced not over 1.2 meters face-to-face, except that where the insulation units are less than 1.2 meters in length the nailers shall be spaced to minimize cutting of the insulation.

3.5 APPLICATION OF INSULATION

Insulation shall be laid in two or more layers. Units of insulation shall be laid in courses parallel with the roof slope. End joints shall be staggered. Insulation shall be cut to fit neatly against adjoining surfaces. Joints between insulation boards shall not exceed 6 mm. Joints in successive layers shall be staggered with respect to joints of preceding layer. Where insulation is applied over steel deck, long edge joints shall continuously bear on surfaces of the steel deck. Insulation which can be readily lifted after installation is not considered to be adequately secured. Insulation shall be applied so that all roof insulation applied each day is waterproofed the same day. Phased construction will not be permitted. Application of impermeable faced insulation shall be performed without damage to the facing.

3.5.1 Mechanical Fastening

On steel decks the insulation shall be mechanically fastened. Method of attachment shall be in accordance with recommendations of the insulation manufacturer and requirements specified. Insulation shall be acceptable for direct application on metal deck.

3.5.2 Foam Insulation

Polyisocyanurate foam insulations shall be isolated from built-up roof and modified bitumen membrane by a separate or composite layer of perlite board or fiberboard. Polystyrene shall not be exposed to solvent-base adhesive, coal-tar bitumen or to asphalt which is hotter than 93 degrees C.

3.5.3 Installation

Roof insulation shall be held in place by mechanical fasteners.

3.5.4 Protection Requirements

The insulation shall be kept dry at all times. Insulation boards shall not be kicked into position. Edges of insulation at open spaces between insulation and parapets or other walls and spaces at curbs, scuttles, and expansion joints, shall be protected until permanent roofing and flashing is applied. Storing, walking, wheeling, or trucking directly on insulation or on roofed surfaces will not be permitted. Smooth, clean board or plank walkways, runways, and platforms shall be used, as necessary to distribute weight to conform to indicated live load limits of roof construction.

3.6 INSPECTION

The Contractor shall establish and maintain an inspection procedure to assure compliance of the installed roof insulation with the contract requirements. Any work found not to be in compliance with the contract shall be promptly removed and replaced or corrected in an approved manner. Quality control shall include, but not be limited to, the following:

- a. Observation of environmental conditions; number and skill level of insulation workers; start and end time of work.
- b. Verification of certification, listing or label compliance with FM P9513.
- c. Verification of proper storage and handling of insulation and vapor retarder materials before, during, and after installation.
- d. Inspection of insulation application, including mechanical fastening.
- e. Inspection of mechanical fasteners; type, number, length, and spacing.
- f. Coordination with other materials, cants, sleepers, and nailing strips.
- g. Inspection of insulation joint orientation and laps between layers, joint width and bearing of edges of insulation on deck.
- h. Continuation of complete roofing system installation to cover insulation installed same day.

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SECTION 07240

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SECTION 07240

DIRECT EXTERIOR FINISH SYSTEM (DEFS)

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM B 117	(1995) Operating Salt Spray (Fog) Testing Apparatus
ASTM C 67	(1996) Sampling and Testing Brick and Structural Clay Tile
ASTM C 920	(1995) Elastomeric Joint Sealants
ASTM C 1149	(1990) Self-Supported Spray Applied Cellulosic Thermal/Acoustical Insulation, or Both
ASTM D 968	(1993) Abrasion Resistance of Organic Coatings by Falling Abrasive
ASTM E 84	(1996) Surface Burning Characteristics of Building Materials
ASTM E 96	(1995) Water Vapor Transmission of Materials
ASTM E 330	(1990) Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
ASTM G 23	(1996) Operating Light-Exposure Apparatus (Carbon-Arc Type) With and Without Water for Exposure of Nonmetallic Materials
ASTM G 53	(1996) Operating Light- and Water-Exposure Apparatus (Fluorescent UV-Condensation Type) For Exposure of Nonmetallic Materials

EIFS INDUSTRY MEMBERS ASSOCIATION (EIMA)

EIMA TM 101.86	(1995; Rev Aug 1995) Resistance of Exterior Insulation Finish Systems (EIFS), Class PB to The Effects of Rapid Deformation (Impact)
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INTERNATIONAL CONFERENCE OF BUILDING OFFICIALS (ICBO)

ICBO-01

(1997) Uniform Building Code (3 Vol.)

1.2 DESCRIPTION

The direct exterior finish system (DEFS) consists of the base coat and finish coat of an exterior insulation and finish system directly applied to gypsum sheathing soffit.

The exterior insulation and finish system (EIFS) shall be a job-fabricated exterior wall covering consisting of insulation, reinforcing fabric, base coat, finish coat, and accessories. The system shall be the standard product of a manufacturer regularly engaged in furnishing exterior insulation and finish systems and shall be installed by an applicator approved by the system manufacturer. EIFS shall be polymer base, Class PB.

Color and finish shall be as specified on drawings.

1.3 PERFORMANCE REQUIREMENTS

1.3.1 Test Specimens

Unless otherwise noted, the test specimens shall consist of reinforcement, base coat and finish coat applied in accordance with the manufacturer's printed recommendations to an insulation board common to the system. These test specimens shall be suitably sized for the apparatus used and be allowed to cure for a minimum of 28 days prior to testing.

1.3.2 Flame Spread

Flame spread test samples consist of base coat, fabric and finish coat, mounted on a non-combustible substrate. When tested in accordance with ASTM E 84, the samples shall have a flame spread rating of 25 or less.

1.3.3 Full Scale Wall Fire Test

Full scale wall fire test specimens shall include the complete system with no less than 100 mm (4 inches) of insulation. Test shall be performed in accordance with ICBO-01, Section 17-6. The specimen shall not contribute to significant or horizontal flame spread.

1.3.4 Impact Test

The exterior insulation and finish system shall have been tested in accordance with EIMA TM 101.86 using a specimen consisting of cured finish system over 25 mm thick insulation with base coat and reinforcing fabric in a complete assembly typical of the project application. Specimen shall withstand an impact of 3 to 6 newton-meters.

1.3.5 Structural Performance Test

The system shall have been tested in accordance with ASTM E 330 to minimum positive and negative pressures of 1.2 kPa. Test panels shall be 1.2 m by 1.2 m minimum, consisting of the typical system assembly.

1.4 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The

following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-06 Instructions

Exterior Finish System; FIO.

Two copies of manufacturer's standard printed instructions for installation of the system. Instructions shall include manufacturer's recommended details for corner treatment, jambs, sills, openings, joints and other special applications.

SD-08 Statements

Manufacturer's Approval and License; FIO.

Statement from manufacturer attesting that the applicator is approved and licensed to install the system.

SD-09 Reports

Exterior Finish System; FIO.

Test Reports indicating that the system complies with the specified performance tests. Tests shall be by an approved, independent testing laboratory.

SD-14 Samples

Exterior Finish System; FIO.

Two samples of each direct exterior finish system. Each sample shall be 300 mm square, minimum, and shall be identical to the proposed installation in thickness, color, texture, and workmanship.

1.5 DELIVERY AND STORAGE

Materials shall be delivered to the jobsite in their original unopened packages, clearly marked with the manufacturer's name, brand name, and description of contents. Storage shall be in accordance with the manufacturer's recommendations in a clean, dry, well-ventilated area. Stored materials shall be protected from sunlight, and kept away from excessive heat. Coating materials which would be damaged by freezing shall be kept at a temperature not less than 4 degrees C.

PART 2 PRODUCTS

2.1 ADHESIVE

Adhesive shall be the manufacturer's standard product, including primer as required, and shall be compatible with the substrate to which the system is applied.

2.2 BASE COAT

Base coat shall be the manufacturer's standard product and shall be compatible with the finish coat.

2.3 REINFORCING FABRIC

Reinforcing fabric shall be balanced, open weave, glass fiber fabric made from twisted multi-end strands specifically treated for compatibility with the other materials of the system.

2.4 MECHANICAL ANCHORS

Mechanical anchors shall be as recommended by the system manufacturer.

2.5 FINISH COATING

Finish coating shall be manufacturer's standard product, uniform in color and conforming to the following requirements. Specimens for tests shall have been cured for a minimum of 28 days.

TEST	RESULTS	METHOD
Abrasion Resistance	500 liters of sand-slight - smoothing - no loss of film integrity.	ASTM D 968
Accelerated weathering Light and water exposure	2000 hours. No deterioration	ASTM G 23 or ASTM G 53
Mildew-fungus resistance	Expose for 28 days at 95 percent RH, 32 degrees C temperature. No growth of mildew or fungus.	ASTM C 1149
Salt spray resistance	Withstand 300 hours. No deleterious effects.	ASTM B 117
Water vapor	Not more than 13 grams per square meter an hour.	ASTM E 96
Absorption-freeze (Pre-weighed 100 mm by 200 mm specimens; 25 mm insulation, faced with finish coat cured and stored in air; tested with edges and back open).	After 50 cycles - Total weight gain of not more than 6.2 grams. No checking, splitting, or cracking	ASTM C 67 50 Cycles: 20 hrs. at -9 degrees C; 4-hr. thaw in water

2.6 SEALANT

Sealant shall meet requirements of ASTM C 920, Class 25, and shall be compatible with the finish system. Type, Grade, and Use shall be as

recommended by both the sealant manufacturer and the system manufacturer. When required, primer, bond breaker and backstop shall be non-staining, and as recommended by the sealant manufacturer and the system manufacturer.

2.7 ACCESSORIES

Accessories shall conform to the recommendations of the system manufacturer and shall include trim, edging, anchors, sealant and filler rod required for proper installation of the system.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

Surface shall be free of oil, loose materials or protrusions which will interfere with the system installation.

3.2 ENVIRONMENTAL CONDITION

Unless a higher temperature is required by the system manufacturer, the ambient air temperature shall be 4 degrees C or greater and rising at the time of installation of the system and shall be predicted to remain at 4 degrees C or greater for at least 24 hours after installation.

3.3 REINFORCING FABRIC

Reinforcing glass fabric shall be installed over substrate and embedded in base coat in accordance with the manufacturer's instructions.

3.4 ADHESIVE SYSTEM

Primer (if required by the manufacturer) and adhesive shall be prepared and applied with a stainless steel trowel to substrate in accordance with the manufacturer's instructions. The pattern of the reinforcing fabric shall not be visible. Adhesive shall be used without fasteners only with Class PB system and when recommended by the manufacturer.

3.5 BASE COAT

Base coat shall be mixed in accordance with the manufacturer's instructions and applied to insulated wall surfaces, trowelling the material into the reinforcing fabric in a tight coat and doubling back to provide complete coverage of the reinforcing fabric, panel joints and fasteners. Base coat may be used to level out surface areas when permitted by the manufacturer.

3.6 FINISH COATING

Finish coating shall be applied and leveled in one operation. Final texture shall be obtained by trowels, floats, or by spray application as necessary to achieve the required finish. Finish surfaces shall be plane, with no deviation greater than 6 mm when tested with a 3 m straightedge.

3.7 SEALANT

Edges of the exterior finish system shall be sealed at openings as recommended by the system manufacturer.

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SECTION 07275

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SECTION 07275

INTUMESCENT MASTIC FIREPROOFING

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 1822	(1989) Tensile Impact Energy to Break Plastics and Electrical Insulating Materials
ASTM D 2486	(1989) Scrub Resistance of Interior Latex Flat Wall Paints
ASTM E 84	(1991a) Surface Burning Characteristics of Building Materials
ASTM E 119	(1988) Fire Tests of Building Construction and Materials

1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Intumescent Mastic Fireproofing; FIO.

Manufacturer's published material specifications and application instructions, including the thickness required for the specified fire rating, tinting requirements, surface preparation, and maintenance instructions, for the fireproofing material shall be submitted prior to proceeding with the work.

Qualifications; FIO.

The Contractor shall submit, prior to start of work, certificates of qualification attesting that the application supervisor and the applicators have received the appropriate factory sponsored training within one year of start of work and are familiar with the proper equipment and manufacturer's mixing and application procedures for the specified fireproofing materials.

Certificates shall also list all training and work experience, as related to the fireproofing materials, of the applicators. Certificates shall be countersigned by the fireproofing manufacturer.

SD-09 Reports

Intumescent Mastic Fireproofing; FIO.

Complete test reports and test records attesting that the fireproofing material, including compatible primers, conform to the specified requirements shall be furnished. All performance test reports shall conform to the requirements for reports of the applicable test method.

SD-14 Samples

Intumescent Mastic Fireproofing; GA.

Prior to initiation of application of the fireproofing material, one sample of each type of fireproofing material proposed for use shall be submitted. Each sample shall be 450 mm square, bonded to the substrate, and shall represent the finish(es) specified. The approved sample(s) will be retained by the Contracting Officer and will serve as a guide to the design detail and as acceptance criteria for surface appearance.

1.3 QUALITY ASSURANCE

A designated sample area of not less than 9 square meters shall receive fireproofing. Sample area will be representative of typical installation of fireproofing including metal decks, beams, columns and attachments. Equipment, materials, procedures, and personnel used to apply fireproofing material for the sample area shall be the same as that to be used in the work. The sample area shall be approved prior to proceeding with fireproofing work in any other areas. The approved sample area shall be used as a reference standard for thickness and texture throughout application of fireproofing material and shall remain in place and open to observation until all fireproofing is approved. Sample area shall become part of the work after all areas to be fireproofed are completed and accepted.

1.4 DELIVERY AND STORAGE

Packaged materials shall be delivered to the jobsite in the original factory sealed packages and containers properly marked and labeled to show manufacturer's name, brand, and type of product. Fire proofing materials shall be kept dry until ready to be used and stored off the ground, under cover and away from damp surfaces. Damaged or opened containers will be rejected. Materials with shelf-life shall be applied prior to expiration of the shelf-life period.

1.5 ENVIRONMENTAL CONDITIONS

1.5.1 Temperature

Substrate and ambient air temperature shall be maintained above 4 degrees C during application, and for 24 hours before and 24 hours after application. Relative humidity shall be maintained within the limits recommended by the fireproofing manufacturer.

1.5.2 Ventilation

Adequate ventilation shall be provided to properly dry the fireproofing after application. In enclosed areas without adequate natural ventilation,

forced air circulation shall be provided.

1.6 SEQUENCING AND SCHEDULING

Application of intumescent mastic fireproofing coating shall occur prior to the installation of ductwork, piping, conduits, equipment, or other obstructions so that the coating can be applied to all structural steel. Fireproofing mastic applied to underside of steel roof deck or steel floor assemblies shall be installed only after respective roof or floor construction is complete.

PART 2 PRODUCTS

2.1 FIREPROOFING MATERIALS

Intumescent fireproofing mastic shall be a commercially manufactured product that cures to a hammer hard, dense coating which shall not spall, dust, flake, crack, or delaminate when subjected to human abuse, vibration, thermal movement of the substrate, or high velocity air movement. When cured, the mastic coating shall retain adequate resilience to allow thermal movement of structural steel without cracking or otherwise disintegrating. Mastic Coating formulation shall not contain asbestos fibers. Fireproofing mastic shall have the following features or properties:

2.1.1 Fire Hazard Classification

Flame spread rating shall be 25 or less, smoke development rating of 50 or less, and fuel contribution rating of 50 or less when tested in accordance with ASTM E 84.

2.1.2 Nontoxicity

Nontoxic to human beings at all stages of application and during fire conditions.

2.1.3 Finish

Mastic Coating shall have a sanded smooth finish, uniform in appearance and free of waves and other defects. Mastic coating shall be painted with primer and two finish coats of flat latex paint without effecting required fire rating. Field painting is specified in Section 09900 PAINTING, GENERAL.

2.1.4 Performance Testing

Fireproofing mastic shall have the performance characteristics listed below. Testing for each characteristic shall be conducted for each type and thickness of material used in the work. Mastic Fireproofing shall be tested by UL or other approved, recognized testing agency.

a. Mastic Coating shall protect the structural integrity of the substrate, and prevent the substrate from charring, when subjected to ASTM E 119 time-temperature fire conditions for the hourly rating(s) shown on the drawings.

b. Mastic Coating shall not crack, spall, or delaminate when tested in accordance with ASTM D 1822.

c. The cured mastic coating surface shall be easily cleaned with a mild soap detergent. It shall be resistant to scrubbing, with no

apparent change in appearance or loss of its intumescent and fire retardant qualities, when tested in accordance with ASTM D 2486.

2.2 PRIMER

Primer shall be the type recommended and approved by the fireproofing manufacturer.

2.3 WATER

Water for mixing shall be clean, fresh, potable, and free from oils, acids, alkalis, and organic matter that would be injurious to the fireproofing.

PART 3 EXECUTION

3.1 PREPARATION

3.1.1 Surface Preparation

Surfaces to be fireproofed shall be thoroughly cleaned of all dirt, grease, oil, paint, rust and mill scale, or other contaminants that will interfere with the proper bonding of the fireproofing to the substrate. Ceiling areas to be fireproofed shall be cleared of all obstructions interfering with the uniform application of the fireproofing.

3.1.1.1 Steel Surfaces

Steel surfaces to be fireproofed shall be primed with a compatible metal primer prior to fireproofing.

3.1.1.2 Existing Painted Surfaces

Where existing painted surfaces will be fireproofed, the existing painted surface shall be tested for compatibility with the fireproofing coating prior to starting fireproofing application. Compatibility testing shall be in accordance with the fireproofing manufacturer's recommendations. If the fireproofing mastic will not adhere firmly to the painted surface, then the painted surface shall be sandblasted clean and reprimed with a primer compatible with the fireproofing mastic.

3.1.2 Surface Acceptability

Surfaces to receive fireproofing shall be inspected prior to application of fireproofing mastic and certified to be clean and in acceptable condition for application of the fireproofing mastic.

3.1.3 Mixing

Fireproofing materials shall be mixed in strict accordance with the manufacturer's recommendations.

3.2 APPLICATION

Fireproofing mastic shall be brush-, rolled-, or spray-applied in accordance with the procedure recommended by the manufacturer. Mastic Coating shall be applied without unsightly drippings or surface irregularities. Pinholes and birdnesting in the coating are not acceptable.

3.2.1 Coating Thickness

Fireproofing coating shall be applied to the thickness required to obtain the specified fire resistance rating. Thicknesses shall be measured on the basis of wet film thickness taken by frequent random probe measurements during application. The Contracting Officer shall be notified at least 10 days in advance of the application of fireproofing so that the Contracting Officer may be present during the measurement of applied thicknesses.

3.2.2 Protection

Surfaces not to receive fireproofing, including instruments, gages, and equipment, shall be covered to prevent contamination by splatter, rebound and overspray. Exterior openings in areas to receive spray-applied fireproofing shall be covered prior to and during application of fireproofing with tarpaulins or other approved material. Roof and floor traffic on surfaces receiving fireproofing material shall not occur during application and curing periods.

3.2.3 Finish

Finished appearance of the fireproofing shall be in conformance with the appearance of the sample(s) submitted prior to initiation of work. Tinting or top coating to achieve the desired color shall be in accordance with the manufacturer's written recommendations.

3.3 REPAIRS

Repairs to damaged areas may be hand trowelled or gloved. When hand trowelling, tools shall be kept wet with the fireproofing manufacturer's recommended solvent in order to avoid sticking.

3.4 INSPECTION

Fireproofed surfaces shall be inspected after mechanical, electrical and other work in contact with fireproofing material has been completed and before fireproofing is covered. Areas requiring additional fireproofing material to provide proper thickness for the specified fire resistance rating shall be recoated in accordance with fireproofing manufacturer's recommendations.

3.5 CLEANUP

Surfaces not indicated to receive fireproofing shall be thoroughly cleaned of all fireproofing material.

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SECTION 07530

ELASTOMERIC ROOFING (EPDM)

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 4637 (1996) EPDM Sheet Used in Single-Ply Roof Membrane

ASTM E 108 (1996) Fire Tests of Roof Coverings

FACTORY MUTUAL ENGINEERING AND RESEARCH (FM)

FM P9513 (1996) Loss Prevention Data for Roofing Contractors

UNDERWRITERS LABORATORIES (UL)

UL 580 (1994; Rev thru Sep 1997) Tests for Uplift Resistance of Roof Assemblies

UL 790 (1995) Tests for Fire Resistance of Roof Covering Materials

UL 1256 (1993; Rev thru Apr 1996) Fire Test of Roof Deck Constructions

1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-04 Drawings

Roofing System; FIO.

Drawings showing size of sheets, position of sheets and splices, flashing details, fastening patterns where applicable for insulation and membrane sheets, and expansion joint details. Detail showing construction of water cutoffs to be used at membrane terminations at the end of a day's work to seal the roofing system from water intrusion.

SD-06 Instructions

Installation; FIO.

Manufacturer's instructions for preparing and installing the membrane, flashings, seams, insulation, nailers and other accessories.

SD-08 Statements

Protection Plan; FIO.

Protection plan showing areas to be protected, type of material used; a plan to protect the membrane from damage until completion of work by other trades, and a description of the method of repairing the roofing.

Inspection; FIO.

The inspection procedure for substrate suitability including decks, curbs and insulation installation, prior to start of the work.

Inspection procedures during and after placement of the membrane, and after completion of work by other trades.

SD-13 Certificates

Materials; FIO.

Certificates of compliance attesting that the roofing system and materials meet specification requirements. The certificates shall list the components required for the specified fire and wind uplift resistance ratings.

1.3 GENERAL REQUIREMENTS

Elastomeric membrane roofing shall be fully adhered to the roof surfaces indicated. Roofing membrane sheet widths shall be consistent with membrane attachment methods and wind uplift requirements, and shall be as large as practical to minimize joints. Membrane shall be free of defects and foreign material. Flashing work shall be coordinated to permit continuous membrane installation operations. Applied insulation shall be weatherproofed by the membrane on the same day.

1.3.1 Delivery and Storage

Materials shall be delivered to the jobsite in the manufacturer's original, unopened packages, clearly marked with the manufacturer's name, brand name, and description of contents. Materials other than ballast shall be stored in clean, dry areas. Storage temperatures shall be as specified by the manufacturer. Materials other than ballast stored on the roof shall not exceed one day's supply and shall be distributed so as not to exceed the roof live load capacity. Ballast shall be stored uncovered, shall not be in contact with sod or earth, and shall not be stored on the roof.

1.3.2 Fire Resistance

The completed roof system shall have a ASTM E 108 (same test as UL 790 and FM P9513, Appendix A) Class B classification, and meet fire test requirements of UL 1256 or FM P9513, Appendix B for roof deck construction.

Compliance of each component of the roofing system shall be evidenced by label or by written certification from the manufacturer.

1.3.3 Wind Uplift Requirements

Fully adhered and mechanically attached roofing systems shall have a 120 UL 580 Class Rating or FM P9513, Appendix C Windstorm Classification. Ratings from other independent laboratories may be substituted provided that the tests, requirements and ratings are documented to be equivalent, to the satisfaction of the Contracting Officer. .

1.3.4 Warranty

Manufacturer's standard warranty for the roofing system shall be provided for not less than 10 years from acceptance of the work. Warranty shall state that manufacturer shall repair or replace defective materials if the roofing system leaks or allows the insulation beneath the membrane to become wet during the period of the warranty.

PART 2 PRODUCTS

2.1 ADHESIVES

Adhesives, splicing cements, solvents, and sealants shall be as recommended by the membrane manufacturer.

2.2 FASTENERS

Fasteners for sheet-metal flashing shall be corrosion resistant steel annular-type nails or screws. Fasteners for anchoring the roofing membrane shall be as approved by the membrane manufacturer and identical to those used to obtain the wind uplift rating.

2.3 FLASHING

Flashing shall be of ultra-violet resistant materials as recommended by the membrane manufacturer. Prefabricated shaped flashings shall be used where possible. Sheared edges of metal flashings that contact the membrane shall be turned into a tight hem.

2.4 MEMBRANE

Membrane shall conform to ASTM D 4637, Type I EPDM, Grade 1; Class U, 1.52 mm minimum thickness or SR, 1.00 mm minimum thickness.

2.5 PREFABRICATED ACCESSORIES

Pipe seals and expansion joint covers shall be types and sizes recommended by the membrane manufacturer.

PART 3 EXECUTION

3.1 ENVIRONMENTAL CONDITIONS

Membrane shall not be installed in high wind, inclement weather or when there is visible ice, frost or moisture on the deck, insulation or membrane. Membrane shall not be installed when air temperature is below the minimum specified by the membrane manufacturer.

3.2 PREPARATION

The substrate of any bay or section of the building shall be complete and suitable for insulation and membrane installation before roofing is begun.

Insulation over which elastomeric roofing is installed shall conform to Section 07220 ROOF INSULATION. Surfaces against which membrane is applied shall be smooth, clean, and free from dirt, water, dew, oil, grease, sharp edges and construction debris; all joints over 6 mm wide shall be sealed; joints over 13 mm between insulation boards shall be filled with the same insulation. Wood nailers shall comply with Section 06100 ROUGH CARPENTRY.

3.3 INSTALLATION

Installation shall comply with the manufacturer's approved instructions, except as otherwise specified.

3.3.1 Flashing

Edges of membrane, projections through the roof and changes in roof planes shall be flashed. The flashing material shall be extended and sealed a minimum of 75 mm on each side of the fasteners which attach the membrane to nailers. The installed flashing shall be fastened at the top of the flashing a maximum of 300 mm on center under metal counter-flashing or cap.

3.3.2 Expansion Joints

Expansion joints shall be covered using prefabricated covers or elastomeric flashing in accordance with the manufacturer's recommendations.

3.3.3 Membrane

Membrane shall be applied in accordance with the manufacturer's instructions and the following requirements. Adjoining sheets comprising the membrane shall be adhered one to another using a butyl-based contact adhesive. Minimum width of the laps shall be 75 mm. A primer shall be used before applying the contact adhesive if required by the membrane manufacturer. In applying the contact adhesive, the minimum thickness of the wet film shall be in accordance with the membrane manufacturer's recommendations. If manufacturer's recommendations are not available, the minimum thickness shall be 0.6 mm. A wet film thickness gage shall be used to determine wet film thickness. Direction of lap shall be such that water flows over lap. Membrane joints shall be free of wrinkles or fishmouths. Before application of the contact adhesive, the rubber surfaces to be mated shall be well cleaned. Joints shall be inspected over entire length after completion and defective areas shall be resealed and patched. Damaged areas of membrane shall be removed and replaced with new materials, lapping underlying membrane by at least 75 mm on all sides.

3.4 PROTECTION OF FINISHED ROOFING

The roofing membrane shall be protected from damage by other trades. After completion of work by other trades, the protection shall be removed and the roof shall be inspected. Any damage shall be repaired in accordance with the recommendations of the roofing manufacturer.

3.5 INSPECTION

The Contractor shall establish and maintain an inspection procedure to assure compliance of the installed elastomeric roofing with the contract requirements. The procedure shall include a checklist of points to be observed. Any work found not to be in compliance with the contract shall be promptly removed and replaced or corrected in an approved manner. Quality control shall include, but not be limited to, the following:

- a. Observation of environmental conditions; number and skill level of roofing workers; start and end time of various tasks; condition of substrate.
- b. Verification of compliance of materials before, during and after installation.
- c. Inspection of insulation, nailers, flashings, penetrations and work requiring coordination with roofing.
- d. Inspection of membrane placement, splicing, and attachment.

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SECTION 07551

MODIFIED BITUMEN ROOFING

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 208	(1995) Cellulosic Fiber Insulating Board
ASTM D 41	(1994) Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing
ASTM D 312	(1995a) Asphalt Used in Roofing
ASTM D 3746	(1985; R 1996) Impact Resistance of Bituminous Roofing Systems
ASTM D 4586	(1993) Asphalt Roof Cement, Asbestos Free
ASTM D 4601	(1997) Asphalt-Coated Glass Fiber Base Sheet Used in Roofing
ASTM D 5147	(1997) Sampling and Testing Modified Bituminous Sheet Material

FACTORY MUTUAL ENGINEERING AND RESEARCH (FM)

FM P7825c	(1997) Approval Guide Building Materials
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UNDERWRITERS LABORATORIES (UL)

UL Bld Mat Dir	(1997) Building Materials Directory
UL 790	(1995) Tests for Fire Resistance of Roof Covering Materials
UL 1256	(1993; Rev thru Apr 1996) Fire Test of Roof Deck Constructions

1.2 SYSTEM DESCRIPTION

The modified bitumen roofing system shall consist of a manufacturer's standard, prefabricated, reinforced polymer-modified bitumen membrane, with base sheet, and insulation as specified and indicated. The manufacturer shall have a minimum of 5 years experience in manufacturing of the proposed modified bitumen sheet roofing for similar applications.

1.3 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-06 Instructions

Materials and Installation; FIO.

Manufacturer's instructions, including membrane description and performance data, detailed procedure for installation, and safety precautions, prior to the start of roofing work.

SD-13 Certificates

Qualifications; FIO.

Evidence that the manufacturer has a minimum of 5 years experience manufacturing modified bitumen roofing. The roofing system applicator shall be approved by the modified bitumen roofing manufacturer, and shall have a minimum of 3 years experience as an approved applicator. A list of installations using the same products and applicator as proposed shall be included.

Materials; FIO.

Certificates of compliance for felts, bitumens, and membrane sheet.

SD-18 Records

Bills of Lading; FIO.

Bills of lading shall indicate the flash point and equiviscous temperature (EVT) and this information shall be shown on labels for each unit (or plug) of asphalt.

1.4 STORAGE OF MATERIALS

Felts and roofing sheets shall be kept dry before, during, and after delivery to the site. Felts and roofing sheets shall be stored on end one level high, in an enclosed building or trailer and on platforms, off the deck or floor. Felts and sheets shall be maintained at a temperature above 10 degrees C for 24 hours immediately before laying.

1.5 COORDINATION REQUIREMENTS

The work shall be coordinated with other trades to ensure that components are available when they are to be secured or stripped into the roofing system.

1.5.1 Insulation Application

Application of roofing shall immediately follow application of insulation as a continuous operation.

1.5.2 Flashing

Modified bituminous sheet shall be used for flashings where the roof deck abuts angles, vertical surfaces, edge metal, and penetrations, unless

otherwise specified or indicated. Flashing shall be installed as the work progresses.

1.5.3 Sheet Metalwork

Sheet metalwork specified in Section 07600 SHEET METALWORK, GENERAL shall be coordinated with roofing operations.

1.6 ENVIRONMENTAL CONDITIONS

Air temperature shall be above 4 degrees C and there shall be no visible ice, frost, or moisture on the roof deck at the time roofing is installed.

1.7 FLAME HEATED EQUIPMENT

Flame heated kettles shall not be placed on the roof. Torch application shall be approved by the membrane manufacturer for the specific modified bitumen. Open flame equipment shall not be left unattended while ignited.

1.8 ELECTRIC-HEATED EQUIPMENT

Adequate electrical service shall be provided as required by the manufacturer of the equipment, to insure proper application of the roofing materials.

1.9 FIRE AND WIND UPLIFT REQUIREMENTS

The complete roof system shall have a UL 1256, UL 790, Class A or B classification, be listed as "fire classified" in UL Bld Mat Dir, and bear the UL label or be listed as a Class I Roof Deck in FM P7825c. Roofing system over steel deck shall be rated Class I- 120 in accordance with FM P7825c. Ratings from other independent laboratories may be substituted provided that the tests, requirements and ratings are documented to be equivalent, to the satisfaction of the Contracting Officer.

1.10 WARRANTY

Manufacturer's standard warranty signed by manufacturer and installer for the roofing system shall be provided for not less than 10 years from acceptance of the work. Warranty shall state that manufacturer shall repair or replace defective materials if the roofing system leaks or allows the insulation beneath the membrane to become wet during the period of the warranty.

PART 2 PRODUCTS

2.1 PRIMER

Primer shall conform to ASTM D 41.

2.2 ASPHALT

Asphalt shall conform to ASTM D 312, Type III for slopes up to 25 percent (1/4 vertical/horizontal) and Type IV for slopes up to 50 percent (1/2 vertical/horizontal).

2.3 BITUMINOUS CEMENT

Bituminous cement shall conform to ASTM D 4586.

2.4 CANTS AND WOOD NAILERS

Treated wood cants and wood nailers shall be of water-borne preservative-treated material as specified in Section 06100 ROUGH CARPENTRY. Cants shall be made from treated wood or treated fiberboard not less than 89 mm high and cut to reduce change in direction of the membrane to 45 degrees or less. Fiberboard shall conform to ASTM C 208, treated with sizing, wax or bituminous impregnation. When membrane or flashing is to be torch applied, cants shall be fire resistant.

2.5 BASE SHEET

Non venting base sheet shall conform to ASTM D 4601, Type II.

2.6 MODIFIED BITUMEN SHEET

Modified bitumen sheet shall be a bitumen modified by atactic polypropylene (APP) or styrene butadiene styrene (SBS); or modified by SBS which has been further modified with styrene ethylene butadiene styrene (SEBS). Sheets shall be uniform in thickness and appearance, and free from blisters or tape splices. Sheets shall not stick to the roll or stack, and shall be suitable for joining along the entire length by the procedure recommended by the manufacturer. Sheet shall be reinforced with fiber made from glass, polypropylene, or polyester, and shall meet the following requirements:

MODIFIED BITUMEN SHEET PROPERTIES

Maximum Load/Elongation, ASTM D 5147, weakest (longitudinal or transverse) direction:

Maximum load, minimum	15 KN/m
Elongation, minimum; when reinforced with:	
glass fiber	3 percent
polyester or polypropylene	40 percent

Tear Strength, ASTM D 5147	
Minimum	356 N

Low Temperature Flexibility, ASTM D 5147	SBS: minus 26 degrees C
	APP: minus 9.4 degrees C

Impact Resistance, ASTM D 3746	No Damage
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2.7 NAILS AND FASTENERS

Nails and fasteners shall be an approved type recommended by the roofing felt or membrane manufacturer.

2.8 SURFACING MATERIAL

Surfacing shall be mineral surfaced modified bitumen cap sheet with factory applied granules requiring no further coating.

2.9 ADHESIVE

Adhesive shall be an approved type recommended by the membrane manufacturer.

2.10 INSULATION

Insulation shall be compatible with the membrane, as recommended by the membrane manufacturer's printed instructions, and as specified in Section 07220 ROOF INSULATION.

PART 3 EXECUTION

3.1 PREPARATION REQUIREMENTS

The substrate construction of any bay or section of the building shall be completed before roofing work is begun thereon. Vents and other items penetrating the roof shall be secured in position and properly prepared for flashing. Nailers, curbs and other items attached to roof surface shall be in place before roofing is begun.

3.2 INSTALLATION OF CANTS

Cants shall be installed in the angles formed between the roof and walls or other vertical surfaces. Cants shall be laid in a solid coat of bituminous cement just prior to laying the base sheet or membrane. Cants shall be continuous, and shall be installed in lengths as long as practicable.

3.3 CONDITION OF SURFACES

Surfaces shall be inspected and approved immediately prior to application of roofing and flashings. The roofing and flashings shall be applied to a smooth and firm surface free from ice, frost, visible moisture, dirt, projections, and foreign materials. Prior to application of primer on precast concrete decks, joints shall be covered with a 100 mm strip of roofing felt, embedded in and coated with bituminous cement. Modified bitumen membrane shall be isolated from coal tar pitch.

3.4 MECHANICAL APPLICATION DEVICES

Mechanical application devices shall be mounted on pneumatic-tired wheels, and shall be designed and maintained to operate without damaging the insulation, roofing membrane, or structural components.

3.5 PRIMING

Concrete, masonry and metal surfaces to receive bitumen shall be uniformly coated with primer at a rate of not less than 0.4 liter per square meter and allowed to dry.

3.6 HEATING OF BITUMEN

Asphalt shall not be heated higher than 42 degrees C above the EVT or 28 degrees C below the flash point or 274 degrees C (maximum) whichever is lower. EVT and flash point temperatures of asphalt in the kettle shall be conspicuously posted on the kettle. Heating kettle shall be provided with automatic thermostatic control and an accurate thermometer. Kettle operators shall be in attendance at all times during the heating to ensure that the maximum temperature specified is not exceeded. An asphalt tanker shall be treated as a kettle.

3.7 BITUMEN APPLICATION

Asphalt shall be applied within 14 degrees C below or above the EVT, or 204 degrees C, whichever is higher. Application temperatures shall be

measured at the mop bucket or mechanical applicator. Bitumen at a temperature below the recommended temperature shall be returned to the kettle.

3.8 APPLICATIONS OF BASE SHEET

Base sheet shall be applied, shingle fashion, in a continuous operation, with side laps in accordance with manufacturer's printed instructions. End laps shall be not less than 150 mm and staggered a minimum of 600 mm. Base sheets shall be applied at right angles to the slope (except on curved or steep deck) and laps shall face down the slope. Non venting base sheet shall be applied in hot mopping of not less than 0.97 kg nor more than 1.7 kg of asphalt per square meter and shall be embedded in the hot asphalt with a squeegee or broom to eliminate air pockets and assure complete adhesion. Operator shall avoid heavy application of squeegees to glass-fiber sheets.

3.9 MODIFIED BITUMEN MEMBRANE APPLICATION

Membrane shall be two plies consisting of one smooth ply and one mineral surfaced cap sheet top ply. Each sheet in each ply shall be fully adhered to the underlying surface. Sheet edges shall lie flat, with no fishmouths or wrinkles. Installation shall begin at the low point of the roof and progress to the high point with each sheet installed shingle fashion. Each sheet shall be unrolled to provide 100 mm side laps and 150 mm end laps. End laps shall be staggered not less than 600 mm. Laps shall not coincide with laps of base layers except at lines of permanent termination. Sheets shall be embedded in hot solid-mopped asphalt, applied at a rate of 0.97 to 1.46 kg per square meter. Hot asphalt shall flow out of all side and end laps. End laps shall be back-mopped.

3.10 TERMINATIONS AT PERIMETERS

The modified bitumen membrane shall extend up abutting surface at least 100 mm or 50 mm above the top of the cant.

3.11 MECHANICAL FASTENING

Nails and fasteners for securing base or membrane sheet to wood nailers or deck shall be flush driven through flat metal disks of not less than 25 mm diameter. Metal disks may be omitted where heads of fasteners are equivalent in size to the 25 mm diameter disks. Screw fasteners with disks as specified by the membrane manufacturer shall be used on concrete or metal deck. Nails and fasteners shall be spaced to meet the wind uplift requirement and within the tolerances specified by the manufacturer. Penetration of nails and fasteners will not be permitted through the exposed surface of membrane.

3.12 PROTECTION OF APPLIED ROOFING

At end of day's work or whenever precipitation is imminent, the terminated edge of the roofing shall be sealed with two full width strips of roofing felt set in and coated with bituminous cement or hot mopped asphalt. One half-width of strips shall be extended up and over the finished roofing and the other half-width extended out and onto the bare roof deck or existing membrane. Sealing strips shall be removed before continuing installation of roofing. To facilitate sealing, termination edges may be straightened with pieces of insulation board which shall be removed when work is resumed.

3.13 FLASHINGS

Flashings shall be provided over cants, in the angles formed at walls and other vertical surfaces, and where required to make the work watertight. Modified bitumen flashings shall be used, except where metal flashings are specified in other sections of the specifications.

3.14 FIRE WATCH

Fire watch shall be provided continuously during and for at least 1 hour following torch application. At least two 9.46 liter containers of water and two 6.8 kg carbon dioxide extinguishers shall be available during the fire watch. When work is interrupted, or at the end of a section of roofing, and at end of each day's work, areas which had been subjected to torch applications shall be surveyed with an infra-red sensing device. Hot spots shall be cooled and re-surveyed. If a hot spot persists, the roof shall be cut open and any smoldering shall be extinguished before the foreman leaves the site.

3.15 INSPECTION

The Contractor shall establish and maintain an inspection procedure to assure compliance of the installed roofing with the contract requirements. Any work found not to be in compliance with the contract shall be promptly removed and replaced or corrected in an approved manner. Inspection shall include, but not be limited to, the following:

- a. Observation of environmental conditions; number and skill level of roofing workers; start and end time of various tasks; condition of substrate.
- b. Verification of compliance of materials before, during, and after installation.
- c. Inspection of condition of equipment and accuracy of thermometers and metering devices.
- d. Inspection of flashings, cants and curbs.
- e. Inspection of membrane placement, including edge envelopes, widths of starter sheets, laps, proper use of squeegee, and mechanical fastening.
- f. Inspection of application of bitumen.
- g. Cutout sampling and analysis as directed.

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SECTION 07570

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SECTION 07570

PEDESTRIAN TRAFFIC COATING

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS

ASTM E 108	(1990) Test Methods for Fire Tests of Roof Coverings.
ASTM C 920	(1987) Specification for Elastomeric Joint Sealants.
ASTM C 957	(1987) Specification for High-Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane with an Integral Wearing Surface.
ASTM C 1127	(1989) Guide for Use of High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane with an Integral Wearing Surface.
ASTM C 1193	(1991) Guide for Use of Joint Sealants.
ASTM D 4258	(1983) (R1988) Practice for Surface Cleaning Concrete for Coating.
ASTM D 4259	(1988) Practice for Abrading Concrete.
ASTM D 4263	(1983) (R1988): Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method.

1.2 SYSTEM DESCRIPTION

Traffic coatings are defined to include cold liquid-applied elastomeric membranes with integral wearing surfaces for application to building decks not subject to hydrostatic pressure in areas housing equipment or subject to pedestrian or vehicular traffic. The following Sections contain requirements related to this Section:

- a. Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE for concrete placement, curing, and finishing.
- b. Section 07900 JOINT SEALING for joint sealant materials and installation.

1.3 SYSTEM PERFORMANCE REQUIREMENTS

1.3.1 General

Provide traffic coatings that are watertight and that will not deteriorate upon exposure to normal ice- and snow-melting compounds, sun, weather, normal traffic, and manufacturer-recommended cleaning procedures.

1.3.2 Compatibility

Traffic coatings shall not deteriorate upon spillage of motor oil, transmission fluids, or other motor vehicle operating compounds. Deterioration of traffic coatings includes but is not limited to:

- a. Adhesive or cohesive failures.
- b. Abrasion or tearing failure resulting from normal traffic.
- c. Surface crazing or spalling.
- d. Intrusion of water, oils, gasoline, grease, salt, deicer chemicals, or acids into deck substrate.

1.3.3 Physical Requirements

Provide traffic coatings that comply with ASTM C 957 and that meet or exceed the following physical requirements.

1. Low-Temperature Flexibility and Crack Bridging (ASTM C 957): No cracking.
2. Adhesion-in-Peel after Water Immersion (ASTM C 957): 5 lbf/inch (875 N/m) on concrete; 3 lbf/inch (525 N/m) on plywood.
3. Chemical Resistance (ASTM C 957): Tensile retention of base, intermediate, and top coats; minimum 70 percent in water, 70 percent in ethylene glycol, and 45 percent in mineral spirits.
4. Weathering Resistance and Recovery from Elongation (ASTM C 957): Average recovery from elongation not less than 90 percent; average tensile retention not less than 80 percent; average elongation retention not less than 90 percent.
5. Abrasion Resistance (ASTM C 957): Weight loss no greater than 50 mg.

1.4 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Product Data; FIO.

Product data consisting of manufacturer's printed instructions for evaluating, preparing, and treating the substrate, technical data, and tested physical and performance properties of traffic coatings.

SD-04 Drawings

Pedestrian Traffic Coating; FIO.

Shop drawings showing extent of each duty category of traffic coating. Include details for substrate joints and cracks, flashings, deck

penetration, and other termination conditions.

SD-08 Statements

Protection Plan; FIO.

Protection plan showing areas to be protected, type of material used; a plan to protect the traffic coating from damage until completion of work by other trades, and a description of the method of repairing the traffic coating.

Inspection; FIO.

The inspection procedure for substrate suitability including decks and substrates, and insulation installation, prior to start of the work. Inspection procedures during and after placement of the membrane, and after completion of work by other trades.

SD-13 Certificates

Materials; FIO.

Material certificates, in lieu of independent testing agency test reports, signed by manufacturer certifying that each traffic coating material complies with requirements.

Installer; FIO.

Manufacturer's certification of installer.

Warranties; GA.

At the completion of the project, signed copies of the 5-year warranty.

SD-14 Samples

Finishes; FIO.

Samples for verification purposes on a rigid backing, in color, texture, and finish required for traffic coatings. Provide stepped samples on backing large enough to illustrate build-up of traffic coatings. Include integral aggregate wearing course in samples.

SD-19 Operation and Maintenance Manuals

Pedestrian Traffic Coating; FIO.

Six copies of maintenance data for traffic coatings. Identify substrate and type of traffic coatings applied. Include recommendations for periodic inspections, cleaning, care, maintenance, and repair of traffic coatings.

1.5 QUALITY ASSURANCE

1.5.1 Installer Qualifications

Installer experienced in applying traffic coatings of comparable scope to this Project and who is acceptable to traffic coating manufacturer.

1.5.2 Single-Source Responsibility

Obtain primary traffic coating materials, including primers and aggregates, from a single manufacturer regularly engaged in manufacturing traffic coatings. Provide secondary materials including sheet flashings, joint sealants, and substrate repair materials of type and from source recommended by traffic coating manufacturer.

1.5.3 Fire-Test-Response Characteristics

Provide traffic coatings that comply with the following requirements:

- a. Fire tests are performed by a qualified testing and inspecting agency that is acceptable to authorities having jurisdiction, such as UL, Warnock Hersey, or another agency that performs testing and follow-up services.
- b. Provide materials identical to those of traffic coatings tested according to ASTM E 108 for deck type and slopes indicated and for the following Class C exterior fire test exposure.

1.6 DELIVERY, STORAGE, AND HANDLING

1.6.1 Delivery

Deliver materials in original packages and containers with seals unbroken and bearing manufacturer's labels containing brand name and type of material, directions for storage and mixing with other components, and the following label information:

- a. Date of manufacture and shelf life.
- b. Lot or batch number.
- c. Application instructions.
- d. Color.

1.6.2 Storage

Store materials in a clean, dry, protected location and within the temperature range required by the manufacturer. Protect stored materials from exposure to direct sunlight. Remove and replace material that cannot be applied within its stated shelf life.

1.7 PROJECT CONDITIONS

Environmental Conditions: Apply traffic coatings within the range of ambient and substrate temperatures recommended by the manufacturer. Do not apply traffic coatings to a damp or wet substrate, when relative humidity exceeds 85 percent, or when temperatures are less than 3 deg C above dew point.

- a. Do not apply traffic coatings in snow, rain, fog or mist, or when such weather conditions are imminent during the application and curing period.

1.8 WARRANTY

General: Submit written warranty signed by contractor, traffic coatings manufacturer and installer agreeing to repair or replace traffic coatings that do not meet requirements or that deteriorate as defined in this Section within the warranty period indicated below. Warranty does not include deterioration or failure of traffic coating due to unusual weather

phenomena, failure of prepared and treated substrate, formation of new joints and cracks in excess of 1.6 mm wide, fire, vandalism, or abuse by maintenance equipment.

Warranty Period: 5 years after date of final acceptance.

PART 2 PRODUCTS

2.1 TRAFFIC COATINGS, GENERAL

2.1.1 Compatibility

Provide primers, base, intermediate, and top coats, and miscellaneous materials that are compatible with one another and with substrate under conditions of service and application, as demonstrated by the manufacturer based on testing and field experience.

2.1.2 Color

Provide color of traffic coatings to match the color of the elastomeric dampproof coating.

2.2 URETHANE TRAFFIC COATING

Provide urethane traffic coatings complying with system performance requirements and manufacturer's printed physical requirements for each coat as certified by a qualified independent testing agency.

2.2.1 Primer

Manufacturer's standard factory-formulated epoxy primer.

2.2.2 Urethane Preparatory, Base, and Intermediate Coats

Single- or multicomponent aromatic liquid urethane elastomer coating.

2.2.3 Aliphatic Urethane Top Coat

Single- or multicomponent aliphatic liquid urethane elastomer coating.

2.2.4 Available Products

Subject to compliance with requirements, traffic coatings that may be incorporated in the Work include, but are not limited to, the following, or equal:

- a. Accoguard; American Colloid Co.
- b. Nu-Klad 470; Ameron Protective Coatings Division.
- c. Futura-Guard I; Futura Coatings, Inc.
- d. Gacoflex GW-13-U; Gaco Western, Inc.
- e. TD-1; Karnak Corp.
- f. Vulkem 350/351; Mameco International.
- g. Multi-Thane 456-85; Multi-Chemical Products, Inc.
- h. Peda-Gard II; Neogard, Div. of Jones-Blair.
- i. Dura-Deck 800-P; Pecora Corp.
- j. Iso-Flex 750 U PED; Harry S. Peterson Company, Inc.
- k. Mark 170.2; Poly-Carb, Inc.
- l. Sonoguard P; Sonneborn Building Products, Division of ChemRex Inc.
- m. Duraldeck; Tamms/A.C. Horn.

- n. Scotch-Clad P; 3M Construction Markets.
- o. PBS-850 HP; Tremco.
- p. Uniflex 455; United Coatings, Uniflex Traffic Deck Division.
- q. Novol 1, Light Duty; Watson Bowman Acme Corp.

2.3 MISCELLANEOUS MATERIALS

2.3.1 Joint Sealants

Multicomponent urethane sealant complying with ASTM C 920 as recommended by manufacturer for substrate and joint conditions, and for compatibility with the following traffic coatings: Type M, Class 25, Grade NS for sloping and vertical applications or Grade P for deck applications, and Use T where subject to traffic or Use NT elsewhere.

2.3.2 Aggregate

Uniformly graded washed silica sand of particle sizes and shape as recommended by traffic coating manufacturer, with minimum hardness of 6 on the Moh Scale.

2.3.3 Sheet Flashing

1.27 mm minimum nonstaining uncured sheet neoprene.

2.3.4 Adhesive

Manufacturer's recommended contact adhesive.

2.3.5 Reinforcing Strip

Manufacturer's recommended fiber-glass mesh.

PART 3 EXECUTION

3.1 EXAMINATION

Examine substrate and conditions under which traffic coating systems will be applied for compliance with requirements. Do not proceed with installation until unsatisfactory conditions have been corrected.

- a. Do not proceed with installation until after the minimum concrete curing period recommended by traffic coating manufacturer.
- b. Verify substrate is visibly dry and free of moisture. Test for capillary moisture by the plastic sheet method according to ASTM D 4263.
- c. Notify the Contracting Officer in writing of anticipated problems using traffic coatings over substrate.

3.2 SURFACE PREPARATION

Clean and prepare substrate according to manufacturer's recommendations and as specified. Provide clean, dust-free, and dry substrate for traffic coating application. Mask off adjoining surfaces not receiving traffic coatings and close off deck drains and other deck penetrations to prevent spillage and migration of liquid coatings.

3.2.1 Concrete Surfaces

Remove grease, oil, paints, or other penetrating contaminants from

concrete. Remove concrete fins, ridges, or other projections. Abrasive-blast clean concrete surfaces to a uniform profile according to ASTM D 4259 with a self-contained recirculating blast-cleaning apparatus. Remove material to provide a sound surface free of laitance, glaze, efflorescence, curing compounds, concrete hardeners, or form release agents. Remove remaining loose material and clean surfaces according to ASTM D 4258.

- a. Surface Profile: Lightly blast the concrete surface to expose the top surface of the fine aggregate.

3.3 PREPARATION AT TERMINATIONS AND PENETRATIONS

Prepare vertical and horizontal surfaces at terminations and penetrations through traffic coatings and at expansion joints, drains, and sleeves according to ASTM C 1127 and manufacturer's recommendations. Provide sealant cants at penetrations and reinforced and nonreinforced deck-to-wall butt joints. Prime substrates and apply preparatory base coat. Embed joint reinforcing strip in coating when recommended by traffic coating manufacturer. Terminate edges of deck-to-deck expansion joints with preparatory base coat strip.

3.4 JOINT AND CRACK TREATMENT

Prepare, treat, rout, and fill joints and cracks in substrate according to ASTM C 1127 and traffic coating manufacturer's recommendations. Remove dust and dirt from joints and cracks complying with ASTM D 4258 prior to coating surfaces.

- a. Prime substrate and apply a 0.5 mm minimum dry film preparatory base coat strip extending a minimum of 50 mm each side of joint. Embed joint reinforcing strip in base coat when recommended by traffic coating manufacturer.
- b. Apply bond-breaker tape between sealant and preparatory base coat strip when required by traffic coating manufacturer.
- c. Comply with recommendations of ASTM C 1193 for joint sealant installation.

3.5 TRAFFIC COATINGS APPLICATION

3.5.1 General

Apply each traffic coating material according to ASTM C 1127 and manufacturer's recommendations.

- a. Apply traffic coating prior to application of elastomeric dampproof coating on concrete wall surfaces.
- b. Start installation of traffic coatings in presence of manufacturer's technical representative.
- c. Mix materials according to manufacturer's instructions.
- d. Apply primer over prepared substrate at manufacturer's recommended spreading rate.
- e. Apply coatings by spray, roller, notched squeegee, or other applicators according to manufacturer's recommendations.
- f. Apply total dry film thickness of traffic coating as indicated, but to not less than the minimum thickness recommended by the manufacturer. Apply each coating to the thickness recommended by the manufacturer.
- g. Apply aggregate into wet coating according to manufacturer's recommendations.

- h. Verify wet film thickness of each component coat every 10 square meters.

3.5.2 Pedestrian Traffic Coating

Apply base, intermediate, and top coats and aggregate according to manufacturers recommendations and as follows.

- a. Heavy Duty: Apply a minimum dry film thickness of 1.0 mm, excluding substrate primer and aggregate.
- b. Aggregate: Apply silica aggregate at minimum rate of 0.75 kg per square meter.

3.5.3 Wall Terminations and Vertical Surfaces

Apply traffic coatings to prepared wall terminations and vertical surfaces to height indicated according to manufacturer's recommendations and details. Omit aggregate on vertical surfaces.

3.6 FIELD QUALITY CONTROL

Test each near-level deck area for leaks immediately after nominal cure of completed traffic coatings. Flood each area for 24 hours and examine underside of decks for evidence of leaks. Repair any leaks observed. Repeat test and make repairs until no leaks remain.

3.7 CURING, PROTECTION, AND CLEANING

Cure traffic coatings according to manufacturer's recommendations taking care to prevent contamination and damage during application stages and curing. Protect traffic coatings from damage and wear during remainder of construction period. Remove temporary covering and clean traffic coatings just before final inspections. Use cleaning materials and procedures recommended by manufacturer.

-- End of Section --

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CONTROL TOWER, LUKE AFB, AZ
DACA09-99-B-0014

SECTION 07600

SHEET METALWORK, GENERAL

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION (AAMA)

AAMA 605.2	(1992; Addenda Feb 1994) Voluntary Specification for High Performance Organic Coatings on Architectural Aluminum Extrusions and Panels
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AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM B 32	(1996) Solder Metal
ASTM B 209	(1996) Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B 221	(1996) Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM D 226	(1997) Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing
ASTM D 543	(1995) Evaluating the Resistance of Plastics to Chemical Reagents
ASTM D 822	(1996) Conducting Tests on Paint and Related Coatings and Materials Using Filtered Open-Flame Carbon-Arc Exposure Apparatus
ASTM D 828	(1993) Tensile Properties of Paper and Paperboard Using Constant-Rate-of-Elongation-Apparatus
ASTM D 2822	(1991; R 1997) Asphalt Roof Cement
ASTM D 3656	(1994) Insect Screening and Louver Cloth Woven from Vinyl-Coated Glass Yarns
ASTM D 4586	(1993) Asphalt Roof Cement, Asbestos Free
ASTM E 96	(1995) Water Vapor Transmission of Materials

INSECT SCREENING WEAVERS ASSOCIATION (ISWA)

ISWA IWS 089 (1990) Recommended Standards and
Specifications for Insect Wire Screening
(Wire Fabric)

SHEET METAL AND AIR CONDITIONING CONTRACTORS NATIONAL ASSOCIATION
(SMACNA)

SMACNA-02 (1993; Errata) Architectural Sheet Metal
Manual

1.2 GENERAL REQUIREMENTS

Sheet metalwork shall be accomplished to form weathertight construction without waves, warps, buckles, fastening stresses or distortion, and shall allow for expansion and contraction.

1.2.1 Coordination

Cutting, fitting, drilling, and other operations in connection with sheet metal required to accommodate the work of other trades shall be performed by sheet metal mechanics. Application of bituminous strip flashing over various sheet metal items is covered in Section 07551 MODIFIED BITUMIN ROOFING. Installation of sheet metal items used in conjunction with roofing shall be coordinated with roofing work to permit continuous roofing operations. Sheet metalwork pertaining to heating, ventilating, and air conditioning is specified in Section 15895 AIR SUPPLY, DISTRIBUTION, VENTILATION, AND EXHAUST SYSTEM. Sheet metalwork pertaining to metal roofing and prefinished trim and fascia is specified in Section 07412 NON-STRUCTURAL METAL ROOFING. Prefinished flat aluminum accent panels is specified in Section 08120 ALUMINUM FRAMES.

1.3 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-04 Drawings

Materials; FIO.

Drawings of sheet metal items showing weights, gauges or thicknesses; types of materials; expansion-joint spacing; fabrication details; and installation procedures.

1.4 DELIVERY, STORAGE, AND HANDLING

Materials shall be adequately packaged and protected during shipment and shall be inspected for damage, dampness, and wet-storage stains upon delivery to the jobsite. Materials shall be clearly labeled as to type and manufacturer. Sheet metal items shall be carefully handled to avoid damage. Materials shall be stored in dry, ventilated areas until immediately before installation.

PART 2 PRODUCTS

2.1 MATERIALS

Lead, lead-coated metal, and galvanized steel shall not be used. Any metal listed by SMACNA-02 for a particular item may be used, unless otherwise specified or indicated. Materials shall conform to the requirements specified below and to the thicknesses and configurations established in SMACNA-02. Different items need not be of the same metal, except that if copper is selected for any exposed item, all exposed items shall be copper.

2.1.1 Accessories

Accessories and other items essential to complete the sheet metal installation, though not specifically indicated or specified, shall be provided.

2.1.2 Aluminum Extrusions

ASTM B 221, Alloy 6063, Temper T5.

2.1.3 Bituminous Cement

Type I asphalt cement conforming to ASTM D 2822 or ASTM D 4586.

2.1.4 Sealant

Unless otherwise specified, sealant shall be an elastomeric weather resistant sealant as specified in Section 07900 JOINT SEALING.

2.1.5 Fasteners

Fasteners shall be compatible with the fastened material and shall be the type best suited for the application.

2.1.6 Felt

ASTM D 226, Type I.

2.1.7 Aluminum Alloy Sheet and Plate

ASTM B 209, form, alloy, and temper appropriate for use.

2.1.8 Solder

ASTM B 32, 95-5 tin-antimony.

2.1.9 Through-Wall Flashing

- a. Nonreinforced, waterproof, impermeable extruded elastomeric single ply sheeting not less than 0.76 mm thick.
- b. Other through-wall flashing material may be used provided the following performance criteria are met.

(1) No cracking or flaking when bent 180 degrees over a 0.8 mm mandrel and rebent at the same point over the same mandrel in an opposite direction at 0 degree C.

(2) Water vapor permeability not more than 115 ng per Paper second per square meter (2 perms) when tested in accordance with

ASTM E 96.

(3) Minimum breaking strength of 24 kgf/15 mm width in the weakest direction when tested in accordance with ASTM D 828.

(4) No visible deterioration after being subjected to a 400-hour direct weathering test in accordance with ASTM D 822.

(5) No shrinkage in length or width and less than 5 percent loss of breaking strength after a 10-day immersion, per ASTM D 543, in 5 percent (by weight) solutions, respectively, of sulfuric acid, hydrochloric acid, sodium hydroxide or saturated lime (calcium hydroxide).

2.1.10 Louver Screen

Type III aluminum alloy insect screening conforming to ISWA IWS 089 and louver cloth conforming to ASTM D 3656.

2.1.11 Perforated Aluminum Soffit

Formed, flat aluminum soffit panels, 300 mm wide, interlocking concealed fastening profile. Perforate soffit panels to provide 50 percent net free open area.

2.1.11.1 Finish; High-Performance Coating

Exposed surfaces of aluminum soffit panels shall be finished with a two-coat fluoropolymer coating system containing at least 70 percent by weight polyvinylidene fluoride, PVF2 resin, factory-applied, oven-baked, conforming to AAMA 605.2, with a primer coat of 0.005 to 0.008 mm (0.20 to 0.030 mils) and a color coat of minimum 0.025 mm (1.0 mil), total dry film thickness of 0.030 to 0.033 mm (1.2 to 1.3 mils). Finish shall be free of scratches and other blemishes.

PART 3 EXECUTION

3.1 GENERAL

Items such as gutters, downspouts and louvers shall be fabricated in conformance with SMACNA-02 and as indicated. Unless otherwise specified or indicated, exposed edges shall be folded back to form a 13 mm (1/2 inch) hem on the concealed side, and bottom edges of exposed vertical surfaces shall be angled to form drips. Bituminous cement shall not be placed in contact with roofing membranes other than built-up roofing.

3.2 EXPANSION JOINTS

Expansion joints shall be provided as indicated and as specified in SMACNA-02. Expansion joints in continuous sheet metal shall be provided at 12.0 meter intervals for copper and stainless steel and at 9.6 meter intervals for aluminum, except extruded aluminum gravel stops and fasciae which shall have expansion joints at not more than 3.6 meter spacing. Joints shall be evenly spaced. An additional joint shall be provided where the distance between the last expansion joint and the end of the continuous run is more than half the required interval spacing.

3.3 PROTECTION OF ALUMINUM

Aluminum shall not be used where it will be in contact with copper or where it will contact water which flows over copper surfaces. Aluminum that will be in contact with wet or pressure-treated wood, mortar, concrete, masonry, or ferrous metals shall be protected against galvanic or corrosive action by one of the following methods:

3.3.1 Paint

Aluminum surfaces shall be solvent cleaned and given one coat of zinc-molybdate primer and one coat of aluminum paint as specified in Section 09900 PAINTING, GENERAL.

3.3.2 Nonabsorptive Tape or Gasket

Nonabsorptive tape or gasket shall be placed between the adjoining surfaces and cemented to the aluminum surface using a cement compatible with aluminum.

3.4 CONNECTIONS AND JOINTING

3.4.1 Soldering

Soldering shall apply to copper, and stainless steel items. Edges of sheet metal shall be pretinned before soldering is begun. Soldering shall be done slowly with well heated soldering irons so as to thoroughly heat the seams and completely sweat the solder through the full width of the seam. Edges of stainless steel to be pretinned shall be treated with soldering acid flux. Soldering shall follow immediately after application of the flux. Upon completion of soldering, the acid flux residue shall be thoroughly cleaned from the sheet metal with a water solution of washing soda and rinsed with clean water.

3.4.2 Riveting

Joints in aluminum sheets 1.0 mm or less in thickness shall be mechanically made.

3.4.3 Seaming

Flat-lock and soldered-lap seams shall finish not less than 25 mm wide. Unsoldered plain-lap seams shall lap not less than 75 mm unless otherwise specified. Flat seams shall be made in the direction of the flow.

3.5 CLEATS

A continuous cleat shall be provided where indicated or specified to secure loose edges of the sheet metalwork. Butt joints of cleats shall be spaced approximately 3 mm apart. The cleat shall be fastened to supporting wood construction with nails evenly spaced not over 300 mm on centers. Where the fastening is to be made to concrete or masonry, screws shall be used and shall be driven in expansion shields set in concrete or masonry.

3.6 GUTTERS AND DOWNSPOUTS

Gutters and downspouts shall be installed as indicated. Gutters shall be supported by continuous cleats or by cleats spaced not less than 915 mm (36 inches) apart. Downspouts shall be rigidly attached to the building. Supports for downspouts shall be spaced according to manufacturer's recommendations.

3.7 FLASHINGS

Flashings shall be installed at locations indicated and as specified below.

Sealing shall be according to the flashing manufacturer's recommendations.

Flashings shall be installed at intersections of roof with vertical surfaces and at projections through roof, except that flashing for heating and plumbing, including piping, roof, and floor drains, and for electrical conduit projections through roof or walls are specified in other sections. Except as otherwise indicated, counter flashings shall be provided over base flashings. Perforations in flashings made by masonry anchors shall be covered up by an application of bituminous plastic cement at the perforation. Flashing shall be installed on top of joint reinforcement. Flashing shall be formed to direct water to the outside of the system.

3.7.1 Counter Flashings

Except as otherwise indicated, counter flashings shall be provided over base flashings. Counter flashing shall be installed as shown on the drawings. Where bituminous base flashings are provided, the counter flashing shall extend down as close as practicable to the top of the cant strip. Counter flashing shall be factory formed to provide spring action against the base flashing.

3.7.2 Through-Wall Flashing

Through-wall flashing includes sill, lintel, and spandrel flashing. The flashing shall be laid with a layer of mortar above and below the flashing so that the total thickness of the two layers of the mortar and flashing are the same thickness as the regular mortar joints. Flashing shall not extend further into the masonry backup wall than the first mortar joint. Joints in flashing shall be lapped and sealed. Flashing shall be one piece for lintels and sills.

3.8 GRAVEL STOPS AND FASCIA

Gravel stops and fascia shall be fabricated and installed as indicated and in accordance with SMACNA-02.

3.9 INSTALLATION OF LOUVERS

Louvers shall be rigidly attached to the supporting construction. The installation shall be rain-tight. Louver screen shall be installed as indicated.

3.10 REGLETS

Reglets shall be a factory fabricated product of proven design, complete with fittings and special shapes as required. Open-type reglets shall be filled with fiberboard or other suitable separator to prevent crushing of the slot during installation. Reglet plugs shall be spaced not over 300 mm on centers and reglet grooves shall be filled with sealant. Friction or slot-type reglets shall have metal flashings inserted the full depth of slot and shall be lightly punched every 300 mm to crimp the reglet and counter flashing together. Polyvinyl chloride reglets shall be sealed with the manufacturer's recommended sealant.

3.11 CONTRACTOR QUALITY CONTROL

The Contractor shall establish and maintain a quality control procedure for sheet metal used in conjunction with roofing to assure compliance of the installed sheet metalwork with the contract requirements. Any work found not to be in compliance with the contract shall be promptly removed and replaced or corrected in an approved manner. Quality control shall include, but not be limited to, the following:

- a. Observation of environmental conditions; number and skill level of sheet metal workers; condition of substrate.
- b. Verification of compliance of materials before, during, and after installation.
- c. Inspection of sheet metalwork for proper size and thickness, fastening and joining, and proper installation.

The actual quality control observations and inspections shall be documented and a copy of the documentation furnished to the Contracting Officer at the end of each day.

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SECTION 07810

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SECTION 07810

SPRAY-APPLIED FIREPROOFING

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM E 119	(1995a) Fire Tests of Building Construction and Materials
ASTM E 605	(1993; R 1996) Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members
ASTM E 736	(1992) Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members
ASTM E 759	(1992; R 1996) Effect of Deflection on Sprayed Fire-Resistive Material Applied to Structural Members
ASTM E 760	(1992; R 1996) Effect of Impact on Bonding of Sprayed Fire-Resistive Material Applied to Structural Members
ASTM E 761	(1992) Compressive Strength of Sprayed Fire-Resistive Material Applied to Structural Members
ASTM E 937	(1993) Corrosion of Steel by Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members
ASTM E 1042	(1992) Acoustically Absorptive Materials Applied by Trowel or Spray
ASTM G 21	(1990) Determining Resistance of Synthetic Polymeric Materials to Fungi

UNDERWRITERS LABORATORIES (UL)

UL Fire Resist Dir	(1998) Fire Resistance Directory (2 Vol.)
UL 263	(1997) Fire Tests of Building Construction and Materials

1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Fireproofing Material; GA.

Data identifying performance characteristics of fireproofing material. Data shall include recommended application requirements and indicate thickness of fireproofing that must be applied to achieve each required fire rating.

SD-09 Reports

UL Test Assembly; FIO.

Reports and test records, attesting that the fireproofing material conforms to the specified requirements. Each test report shall conform to the report requirements specified by the test method.

Field Tests; FIO.

Test reports documenting results of tests on the applied material in the project. Report shall include defects identified, repair procedures, and results of the retests when required.

SD-13 Certificates

Installer Qualifications; GA.

Manufacturer's certification that each listed installer is qualified and trained to install the specified fireproofing. Evidence that each fireproofing installer has had a minimum of 3 years experience in installing the specified type of fireproofing.

Surface Acceptability; FIO.

Manufacturer's certification that surfaces to be protected have been inspected and are acceptable to receive spray-applied fireproofing. The statement shall list the structural members and the areas that have been inspected and certified.

Manufacturer's Inspection; FIO.

Manufacturer's certification that the spray-applied fireproofing in the entire project complies with the manufacturer's criteria and recommendations.

SD-14 Samples

Spray-Applied Fireproofing; GA.

One sample panel, 450 mm square, for each specified type of fireproofing. Also, a designated sample area of not less than 9 square meters shall be

prepared. Sample area shall be representative of typical installation of fireproofing including metal decks, beams, columns and attachments. Equipment, materials and procedures used in the sample area shall be the same as, or representative of, that to be used in the work. The sample area shall be approved prior to proceeding with fireproofing work in any other area. The approved sample area shall be used as a reference standard for applied fireproofing material. Sample area shall remain in place and open to observation until all spray-applied fireproofing is completed and accepted, at which time it may become part of the work.

1.3 DELIVERY AND STORAGE

Packaged material shall be delivered in the original unopened containers, marked to show the names of the brand and the manufacturer. Fireproofing material shall be kept dry until ready to be used, and shall be stored off the ground, under cover and away from damp surfaces. Damaged or opened containers will be rejected. Material with shelf-life shall be applied prior to expiration of the shelf-life.

1.4 ENVIRONMENTAL CONDITIONS

1.4.1 Temperature

Substrate and ambient air temperatures shall be maintained above 4 degrees C during application and for 24 hours before and after application. Relative humidity shall be maintained within the limits recommended by the fireproofing manufacturer.

1.4.2 Ventilation

Adequate ventilation shall be provided to properly dry the fireproofing after application. In enclosed areas, a minimum of 4 air exchanges per hour shall be provided by forced air circulation.

1.5 INSTALLER QUALIFICATIONS

Each installer of fireproofing material shall be trained and have a minimum of 3 years experience in the installation of fireproofing of the type specified.

1.6 MANUFACTURER'S SERVICES

The manufacturer or its representative shall be onsite prior to, periodically during, and at completion of the application, to provide the specified inspections and certifications; and to ensure that preparations are adequate and that the material is applied according to manufacturer's recommendations and the contract requirements.

1.7 FIRE RESISTANCE RATING

Fire resistance ratings shall be in accordance with the fire rated assemblies listed in UL Fire Resist Dir. Proposed materials not listed in UL Fire Resist Dir shall have fire resistance ratings at least equal to the UL Fire Resist Dir ratings as determined by an approved independent testing laboratory, based on tests specified in UL 263 or ASTM E 119.

1.8 EXTENT OF FIREPROOFING

In areas indicated on drawings structural steel, and the underside of steel

floor and steel roof decks shall be protected with spray-applied fireproofing to a fire resistance hour-rating as indicated.

PART 2 PRODUCTS

2.1 SPRAY-APPLIED FIREPROOFING

Spray-applied fireproofing material, including sealer, shall conform to ASTM E 1042, Class (a), Category A, either Type I or Type II, except that the dust removed shall not exceed 0.027 gram per square meter of fireproofing material applied as specified in the project. Material shall be asbestos free, and shall resist fungus for a period of 28 days when tested in accordance with ASTM G 21.

2.1.1 Dry Density and Cohesion/Adhesion

Fireproofing shall have a minimum ASTM E 605 dry density and ASTM E 736 cohesion/adhesion properties as follows:

2.1.1.1 Concealed Structural Components

Fireproofing for structural components concealed above the ceiling, or within a wall, chase, or furred space, shall have a minimum average applied dry density of 240 kg per cubic meter and a cohesion/adhesion strength of 9.57 kPa (200 pounds per square foot.)

2.1.1.2 Exposed Structural Components

Fireproofing for exposed structural components, except where otherwise specified or indicated, shall have a minimum applied dry density of 350 kg per cubic meter and a cohesion/adhesion strength of 14.36 kPa.

2.1.1.3 Mechanical Rooms and Storage Areas

Fireproofing for structural components located in mechanical rooms and storage areas shall have a minimum applied dry density of 640 kg per cubic meter and a cohesion/adhesion strength of 19.15 kPa.

2.1.2 Deflection

Spray-applied fireproofing shall not crack, spall, or delaminate when tested in accordance with ASTM E 759.

2.1.3 Bond-Impact

Spray-applied fireproofing material shall not crack, spall or delaminate when tested in accordance with ASTM E 760.

2.1.4 Compressive Strength

The minimum compressive strength shall be 48 kPa when tested in accordance with ASTM E 761.

2.1.5 Corrosion

Spray-applied fireproofing material shall not contribute to corrosion of test panels when tested as specified in ASTM E 937.

2.2 SEALER

Sealer shall be the type approved by the manufacturer of the fireproofing material and shall be of color to contrast with fireproofing.

2.3 WATER

Water used for material mixing and surface preparation shall be potable.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

Surfaces to be fireproofed shall be thoroughly cleaned of dirt, grease, oil, paint, loose rust, rolling lubricant, mill scale or other contaminants that will interfere with the proper bonding of the sprayed fireproofing to the substrate. Overhead areas to be fireproofed shall be cleared of all obstructions interfering with the uniform application of the spray-applied fireproofing. Hardware such as support sleeves, inserts, clips, hanger attachment devices and the like shall be installed prior to the application of the fireproofing. Condition of the surfaces shall be acceptable to the manufacturer prior to application of spray-applied fireproofing. Applications listed for use on primed surfaces shall be coordinated with the manufacturer and detailed in submittal item SD-01 Data.

3.2 PROTECTION

Surfaces not to receive spray-applied fireproofing shall be covered to prevent contamination by splatter, rebound and overspray. Exterior openings in areas to receive spray-applied fireproofing shall be covered prior to and during application of fireproofing with tarpaulins or other approved material. Surfaces not to receive fireproofing shall be cleaned of fireproofing and sealer.

3.3 MIXING

Fireproofing material shall be mixed in accordance with the manufacturer's recommendations.

3.4 APPLICATION

3.4.1 Sequence

Prior to application of fireproofing on each floor, the manufacturer shall inspect and approve application equipment, water supply and pressure, and the application procedures. Fireproofing shall be applied to underside of steel roof deck or steel floor assemblies only after respective roof or floor construction is complete. Fireproofing material shall be applied prior to the installation of ductwork, piping and conduits which would interfere with uniform application of the fireproofing. The Contractor shall not allow roof traffic during application and curing period.

3.4.2 Application Technique

Water pressure and volume shall be maintained to manufacturer's recommendations throughout the fireproofing application. Fireproofing material shall be applied to the thickness established for the specified fire resistance rating, in accordance with the procedure recommended by the manufacturer, and to a uniform density and texture. Fireproofing material shall not be tamped to achieve the desired density. Sealer shall be

applied to all fireproofing.

3.5 FIELD TESTS

The applied fireproofing shall be tested by an approved independent testing laboratory, in approved locations, for density, cohesion/adhesion force as specified, and for thickness in accordance with ASTM E 605. Two sets of tests shall be conducted on each floor or 930 square meter area, whichever is less, at the approved locations. Any area showing less than minimum requirements shall be corrected. Proposed corrective measures, in writing, shall be approved before starting the corrective action. Corrected work shall be retested.

3.5.1 Thickness, Density, Cohesion/Adhesion

Each structural component type shall be tested at floor and roof decks, beams, columns, joists, and trusses. Minimum average thickness shall be as required by UL Fire Resist Dir. Density and cohesion/adhesion shall be as specified.

3.5.2 Repair

Additional fireproofing material may be added to provide proper thickness. Rejected areas of fireproofing shall be corrected to meet specified requirements by adding fireproofing material to provide the proper thickness, or by removing defects and respraying with new fireproofing material. Repairs shall use same type of fireproofing material as originally applied. Repaired areas shall be retested and reinspected. Fireproofing material shall be applied to voids or damaged areas by hand-trowel, or by respraying.

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SECTION 07840

FIRESTOPPING

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM E 84	(1996a) Surface Burning Characteristics of Building Materials
ASTM E 119	(1995a) Fire Tests of Building Construction and Materials
ASTM E 814	(1994b) Fire Tests of Through-Penetration Fire Stops

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(1996) National Electrical Code
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UNDERWRITERS LABORATORIES (UL)

UL 723	(1996) Test for Surface Burning Characteristics of Building Materials
UL 1479	(1994; Rev thru Jul 1997) Fire Tests of Through-Penetration Firestops
UL 2079	(1997) Tests for Fire Resistance of Building Joint Systems
UL Fire Resist Dir	(1997) Fire Resistance Directory

1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-04 Drawings

Firestopping Materials; FIO.

Detail drawings including manufacturer's descriptive data, typical details,

installation instructions and the fire-test data and/or report as appropriate for the fire resistance rated construction and location. Submittal shall indicate the firestopping material to be provided for each type of application. When more than 5 penetrations or construction joints are to receive firestopping, drawings shall indicate location and type of application.

SD-13 Certificates

Firestopping Materials; FIO.

Certificates attesting that firestopping material complies with the specified requirements. The label or listing of the Underwriters Laboratories will be acceptable evidence. In lieu of the label or listing, a written certificate may be submitted from an approved, nationally recognized testing agency equipped to perform such services, stating that the items have been tested and conform to the specified requirements and testing methods.

Installer Qualifications; FIO.

Documentation of training and experience.

Inspection; FIO.

Manufacturer's representative certification stating that firestopping work has been inspected and found to be applied according to the manufacturer's recommendations and the specified requirements.

1.3 GENERAL REQUIREMENTS

Firestopping shall consist of furnishing and installing a material or a combination of materials to form an effective barrier against the spread of flame, smoke and gases, and maintain the integrity of fire resistance rated walls, partitions, floors, and ceiling-floor assemblies, including through-penetrations and construction joints. Through-penetrations include the annular space around pipes, tubes, conduit, wires, cables and vents. Construction joints include those used to accommodate expansion, contraction, wind, or seismic movement; firestopping material shall not interfere with the required movement of the joint. Gaps requiring firestopping include gaps between the top of the fire-rated walls and the floor or roof deck above.

1.4 STORAGE AND DELIVERY

Materials shall be delivered in the original unopened packages or containers showing name of the manufacturer and the brand name. Materials shall be stored off the ground and shall be protected from damage and exposure to elements. Damaged or deteriorated materials shall be removed from the site.

1.5 INSTALLER QUALIFICATIONS

Installer of firestopping material shall be trained by the manufacturer or the manufacturer's representative, and shall have a minimum of 3 years experience in the installation of firestopping of the type specified.

PART 2 PRODUCTS

2.1 FIRESTOPPING MATERIALS

Firestopping materials shall consist of commercially manufactured products complying with the following minimum requirements:

2.1.1 Fire Hazard Classification

Material shall have a flame spread of 25 or less, and a smoke developed rating of 50 or less, when tested in accordance with ASTM E 84 or UL 723. Material shall be an approved firestopping material as listed in UL Fire Resist Dir or by a nationally recognized testing laboratory.

2.1.2 Toxicity

Material shall be nontoxic to humans at all stages of application.

2.1.3 Fire Resistance Rating

Firestopping will not be required to have a greater fire resistance rating than that of the assembly in which it is being placed.

2.1.3.1 Through-Penetrations

Firestopping materials for through-penetrations, as described in paragraph GENERAL REQUIREMENTS, shall provide "F" and "T" fire resistance ratings in accordance with ASTM E 814 or UL 1479, except that T Ratings are not required for penetrations smaller than or equal to a 100 mm nominal pipe or 0.01 square meter in overall cross sectional area. Fire resistance ratings shall be the following:

- a. Penetrations of 1-Hour Fire Resistance Rated Walls and Partitions:
F Rating = 1 hour, T Rating = 1 hour.
- b. Penetrations of 2-Hour Fire Resistance Rated Walls and Partitions:
F Rating = 2 hour, T Rating = 2 hour.
- c. Penetrations of 2-Hour Fire Resistance Rated Floors: F Rating = 2 hour, T Rating = 2 hour.
- d. Penetrations of 1-Hour Fire Resistance Rated Roof Assemblies: F Rating = 1 hour, T Rating = 1 hour.

2.1.3.2 Construction Joints and Gaps

Fire resistance ratings of construction joints, as described in paragraph GENERAL REQUIREMENTS, and gaps such as those between floor slabs or roof decks and exterior precast concrete walls shall be the same as the construction in which they occur. Construction joints and gaps shall be provided with firestopping materials and systems that have been tested per ASTM E 119 or UL 2079 to meet the required fire resistance rating.

PART 3 EXECUTION

3.1 PREPARATION

Areas to receive firestopping shall be free of dirt, grease, oil, or loose materials which may affect the fitting or fire resistance of the firestopping system.

3.2 INSTALLATION

Firestopping material shall completely fill void spaces regardless of geometric configuration, subject to tolerance established by the manufacturer. Firestopping for filling floor voids 100 mm or more in any direction shall be capable of supporting the same load as the floor is designed to support or shall be protected by a permanent barrier to prevent loading or traffic in the firestopped area. Firestopping shall be installed in accordance with manufacturer's written instructions and as listed in UL Fire Resist Dir . Firestopping at penetrations shall also comply with the requirements of NFPA 70. Firestopping shall be provided in the following locations, except in floor slabs on grade:

- a. Penetrations of duct, conduit, tubing, cable and pipe through floors and through fire-resistance rated walls, partitions, and ceiling-floor assemblies.
- b. Penetrations of vertical shafts such as pipe chases, elevator shafts, and utility chutes.
- c. Gaps at the intersection of floor slabs and exterior precast concrete walls.
- d. Gaps at perimeter of fire-resistance rated walls and partitions, such as between the top of the walls and the bottom of floor or roof decks.
- e. Construction joints in floors and fire rated walls and partitions.
- f. Other locations where required to maintain fire resistance rating of the construction.

3.3 INSPECTION

Firestopped areas shall not be covered or enclosed until inspection is complete and approved. A manufacturer's representative shall inspect the applications initially to ensure adequate preparations (clean surfaces suitable for application, etc.) and periodically during the work to assure that the completed work has been accomplished according to the manufacturer's written instructions and the specified requirements.

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SECTION 07900

JOINT SEALING

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 509	(1994) Elastomeric Cellular Preformed Gasket and Sealing Material
ASTM C 734	(1993) Low-Temperature Flexibility of Latex Sealants After Artificial Weathering
ASTM C 834	(1995) Latex Sealants
ASTM C 920	(1995) Elastomeric Joint Sealants
ASTM D 217	(1994) Cone Penetration of Lubricating Grease (IP50/88)
ASTM D 1056	(1991) Flexible Cellular Materials - Sponge or Expanded Rubber
ASTM D 1565	(1981; R 1990) Flexible Cellular Materials - Vinyl Chloride Polymers and Copolymers (Open-Cell Foam)
ASTM E 84	(1996a) Surface Burning Characteristics of Building Materials

1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Backing; FIO. Bond-Breaker; FIO.

Sealant; FIO.

Manufacturer's descriptive data including storage requirements, shelf life, curing time, instructions for mixing and application, and primer data (if required). A copy of the Material Safety Data Sheet shall be provided for each solvent, primer or sealant material.

SD-13 Certificates

Sealant; FIO.

Certificates of compliance stating that the materials conform to the specified requirements.

1.3 ENVIRONMENTAL REQUIREMENTS

The ambient temperature shall be within the limits of 4 to 32 degrees C when the sealants are applied.

1.4 DELIVERY AND STORAGE

Materials shall be delivered to the job in the manufacturer's original unopened containers. The container label or accompanying data sheet shall include the following information as applicable: manufacturer, name of material, formula or specification number, lot number, color, date of manufacture, mixing instructions, shelf life, and curing time at the standard conditions for laboratory tests. Materials shall be handled and stored to prevent inclusion of foreign materials. Materials shall be stored at temperatures between 4 and 32 degrees C unless otherwise specified by the manufacturer.

PART 2 PRODUCTS

2.1 BACKING

Backing shall be 25 to 33 percent oversize for closed cell and 40 to 50 percent oversize for open cell material, unless otherwise indicated.

2.1.1 Rubber

Cellular rubber sponge backing shall be ASTM D 1056, Type 1, open cell, or Type 2, closed cell, Class A, Grade O, round cross section.

2.1.2 PVC

Polyvinyl chloride (PVC) backing shall be ASTM D 1565, Grade VO 12, open-cell foam, round cross section.

2.1.3 Synthetic Rubber

Synthetic rubber backing shall be ASTM C 509, Option I, Type I preformed rods or tubes.

2.1.4 Neoprene

Neoprene backing shall be ASTM D 1056, closed cell expanded neoprene cord Type 2, Class C, Grade 2C2.

2.2 BOND-BREAKER

Bond-breaker shall be as recommended by the sealant manufacturer to prevent adhesion of the sealant to backing or to bottom of the joint.

2.3 PRIMER

Primer shall be non-staining type as recommended by sealant manufacturer

for the application.

2.4 SEALANT

2.4.1 LATEX

Latex Sealant shall be ASTM C 834.

2.4.2 ELASTOMERIC

Elastomeric sealants shall conform to ASTM C 920 and the following:

- a. Polyurethane sealant: Grade NS, Class 25, Use T, NT, M, G, A, O.

2.4.3 ACOUSTICAL

Rubber or polymer-based acoustical sealant shall have a flame spread of 25 or less and a smoke developed rating of 50 or less when tested in accordance with ASTM E 84. Acoustical sealant shall have a consistency of 250 to 310 when tested in accordance with ASTM D 217, and shall remain flexible and adhesive after 500 hours of accelerated weathering as specified in ASTM C 734, and shall be non-staining.

2.4.4 PREFORMED

Preformed sealant shall be polybutylene or isoprene-butylene based pressure sensitive weather resistant tape or bead sealant capable of sealing out moisture, air and dust when installed as recommended by the manufacturer. At temperatures from minus 34 to plus 71 degrees C, the sealant shall be non-bleeding and shall have no loss of adhesion.

2.4.4.1 Tape

Tape sealant: cross-section dimensions shall be 3 mm by 9 mm.

2.4.4.2 Bead

Bead sealant: cross-section dimensions shall be 6 mm.

2.5 SOLVENTS AND CLEANING AGENTS

Solvents, cleaning agents, and accessory materials shall be provided as recommended by the manufacturer.

PART 3 EXECUTION

3.1 GENERAL

3.1.1 Surface Preparation

The surfaces of joints to receive sealant or caulk shall be free of all frost, condensation and moisture. Oil, grease, dirt, chalk, particles of mortar, dust, loose rust, loose mill scale, and other foreign substances shall be removed from surfaces of joints to be in contact with the sealant.

Oil and grease shall be removed with solvent and surfaces shall be wiped dry with clean cloths. For surface types not listed below, the sealant manufacturer shall be contacted for specific recommendations.

3.1.2 Concrete and Masonry Surfaces

Where surfaces have been treated with curing compounds, oil, or other such materials, the materials shall be removed by sandblasting or wire brushing. Laitance, efflorescence and loose mortar shall be removed from the joint cavity.

3.1.3 Steel Surfaces

Steel surfaces to be in contact with sealant shall be sandblasted or, if sandblasting would not be practical or would damage adjacent finish work, the metal shall be scraped and wire brushed to remove loose mill scale. Protective coatings on steel surfaces shall be removed by sandblasting or by a solvent that leaves no residue.

3.1.4 Aluminum Surfaces

Aluminum surfaces to be in contact with sealants shall be cleaned of temporary protective coatings. When masking tape is used for a protective cover, the tape and any residual adhesive shall be removed just prior to applying the sealant. Solvents used to remove protective coating shall be as recommended by the manufacturer of the aluminum work and shall be non-staining.

3.1.5 Wood Surfaces

Wood surfaces to be in contact with sealants shall be free of splinters and sawdust or other loose particles.

3.2 APPLICATION

3.2.1 Masking Tape

Masking tape may be placed on the finish surface on one or both sides of a joint cavity to protect adjacent finish surfaces from primer or sealant smears. Masking tape shall be removed within 10 minutes after joint has been filled and tooled.

3.2.2 Backing

Backing shall be installed to provide the indicated sealant depth. The installation tool shall be shaped to avoid puncturing the backing.

3.2.3 Bond-Breaker

Bond-breaker shall be applied to fully cover the bottom of the joint without contaminating the sides where sealant adhesion is required.

3.2.4 Primer

Primer shall be used on concrete masonry units, wood, or other porous surfaces in accordance with instructions furnished with the sealant. Primer shall be applied to the joint surfaces to be sealed. Surfaces adjacent to joints shall not be primed.

3.2.5 Sealant

Sealant shall be used before expiration of shelf life. Multi-component sealants shall be mixed according to manufacturer's printed instructions. Sealant in guns shall be applied with a nozzle of proper size to fit the

width of joint. Joints shall be sealed as detailed in the drawings. Sealant shall be forced into joints with sufficient pressure to expel air and fill the groove solidly. Sealant shall be installed to the indicated depth without displacing the backing. Unless otherwise indicated, specified, or recommended by the manufacturer, the installed sealant shall be dry tooled to produce a uniformly smooth surface free of wrinkles and to ensure full adhesion to the sides of the joint; the use of solvents, soapy water, etc., will not be allowed. Sealants shall be installed free of air pockets, foreign embedded matter, ridges and sags. Sealer shall be applied over the sealant when and as specified by the sealant manufacturer.

3.3 CLEANING

The surfaces adjoining the sealed joints shall be cleaned of smears and other soiling resulting from the sealant application as work progresses.

3.4 JOINT SEALANT USES

Sealing of joints at fire rated walls, ceilings and floors shall comply with requirements of Section 07840 FIRESTOPPING. The sealant(s) to be used in the various joints indicated shall be as follows:

3.4.1 LATEX SEALANT

Latex sealant shall be used on interior applications for caulking joints in wood or masonry, or in narrow joints between masonry surfaces, wood surfaces, or metal surfaces where limited movement is anticipated. The listing below indicates the type of applications appropriate for use of latex sealant.

- a. Openings 1/4 inch and less between walls and partitions and adjacent casework, door frames, built-in or surface-mounted equipment and fixtures, etc.
- b. Perimeters of frames of doors, windows, and access panels which adjoin exposed interior concrete and masonry surfaces.
- c. Joints between interior masonry walls and partitions and columns, pilasters, concrete walls, or exterior walls unless otherwise detailed.
- d. Joints between metal edge members for acoustical tile and adjoining vertical surfaces.
- e. Other interior locations where small voids between materials require filling for first-class workmanship and painting.

3.4.2 ELASTOMERIC SEALANT

Sealant shall be used on exterior applications for sealing control joints and expansion and other movable joints in concrete, masonry, and metal where cyclic movement is anticipated. The listing below indicates the types of applications appropriate for use of sealant:

- a. Joints and recesses formed where frames and subsills of windows, doors, louvers, and vents adjoin masonry, concrete, or metal frames. Use sealing compound at both exterior and interior surfaces of exterior wall penetrations.
- b. Joints between new and existing exterior walls.

- c. Precast concrete units joints.
- d. Seats of metal thresholds for exterior doors.
- e. Expansion and control joints.
- f. Interior face of expansion joints in exterior precast concrete walls where no metal expansion joint covers are required.
- g. Openings where items pass through exterior walls.
- h. Metal-to-metal joints where sealing or caulking is shown or specified.
- i. Joints occurring between ends of gravel stops, fasciae and/or copings and adjacent walls.
- j. Bottoms of exterior doorway frames.
- k. Decks and walkways.

3.4.3 ACOUSTICAL SEALANT

- a. Set gypsum drywall metal sill track in two strips of sealant beads or preformed tape.
- b. Seal both sides of gypsum drywall partition at adjoining concrete or masonry wall.
- c. Seal both sides at top of gypsum drywall partition at floor or roof structure above.
- d. Seal junction boxes and other penetrations in gypsum drywall partitions.
- e. Elsewhere as indicated on drawings.

-- End of Section --